

## Bloom's Taxonomy vs. Game-Based Learning: toward a preliminary theory on games and learning

Leo L. Cao

Doctoral Student & Teaching Fellow

SILS @ UNC-Chapel Hill

In a society with a fluid flow of information across and between multiple mediums, digital games are a curious entity to many. Interest in researching games and its possible connection to learning spans decades of work in several fields, however, continuity of the work and empirical understanding seem to be few and far in between. The most recent surge in interest in understanding digital games is coupled with the explosive growth in the reach that digital games have made since the days of Pong and Atari. According to the 2008 Entertainment Software Association (ESA) report, 38% of the households in the U.S. own a gaming console, and the most recent 2008 Pew Internet study on Teens and their media behavior, indicated that almost all teens play games (97%).

This poster aims to use Bloom's Taxonomy as the basis for analyzing Game-Based Learning – to be drawn from the works by prominent game researchers & writers (Gee, Prensky, Squire, Kirriemuir, etc.), and results of large scale projects on games and learning (MIT's Games to Teach, CMU's Alice, etc.). The primary question being whether the game-based learning approaches documented in the existing research fit Bloom et al.'s Taxonomy – a widely referenced baseline framework categorizing educational goals and objectives, used by educators at all levels for over half a century. This is not an analysis of how game-based learning might be good or bad, it simply seeks to shine light on what parameters constitutes game based learning by benchmarking it against an existing well-known framework.

There's no standard consensus definition of what is a game (let alone what constitutes game-based learning), many have tried to categorize based on a variety of factors. What falls under the umbrella as digital games can mean drastically different experiences. For example, Guitar hero is one set of game that is fundamentally different form of experience than that of, say World of Warcraft (WoW), or the Civilization Series, or where Solitaire fit as a game. Focus on the genre types and experiences of one game and how it's similar or different from another is quite interesting, but also goes in endless circles that might be counterproductive. Whether games are positive or negative for people is an open question w/ wide ranging debate (and not answered here), what isn't debatable is the sheer number of man-hours being expended (WoW estimates at 10 million active subscribers, at roughly 20hrs/wk; let's not forget the 38% console ownership and how many hours that may translate to).

That said, much of the existing academic research on digital games is in silos or small pockets – that's not to say a lack of interest, there are several conferences large and small each year around

the globe on games. This is also augmented by many enthusiastic authors, teachers, and parents seeing potential in games as a revolutionary medium in which students master content and skill while having fun playing games.

Before this drifts off to obscurity, what exactly is the connection, if any, between digital games, learning, and Bloom's Taxonomy? The initial inspiration to look into a plausible connection came from hearing of a second-hand exchange regarding a recent 2008 ASIS&T closing plenary speaker session – in which an audience member commented that a speaker's advocacy for games as vehicle of learning and education does not fit Bloom's Taxonomy. Now, does it? At face value, it does not, but in closer inspection of the taxonomy and in analysis of how complex a data flow chart of what a gaming session involves – there's much more connection points here than meets the eye.

In the 2001 revised Bloom's Taxonomy, "creating" is the penultimate high-level learning, in contrast w/ the lower levels of fact and knowledge building. Comparing that perspective to the Alice game distributed by Carnegie Mellon and championed by the late, famed last lecture professor Randy Pausch – uses the popular Sims models for creating characters and interactions as means to learn object-oriented programming. In Bloom's Taxonomy, there's a presumption that one must master the low-tier elements before reaching true learning, in the form of being able to evaluate and create. Whereas in much of the digital game environments, players are often expected to create, improvise and learn from their mistakes first, then learn the details later. This contradiction shows where the interesting parts are, in the details. For players to perform competently, they need to learn and understand the game, inclusive of all the dimensions outlined in Bloom's Taxonomy. But rather than the linear order that makes Bloom's Taxonomy neat and useful for curriculum planning & evaluation purposes, the game-based approach looks to take a different route in how players pickup and use knowledge.

This poster will outline these 3 components in graphical displays,

- Bloom's Taxonomy (Remembering, Understanding, Applying, Analyzing, Evaluating, Creating – Anderson 2001)
- Data flow diagram of a commercial and/or an educational digital game play session
- Comparative pieces drawn from contemporary game researchers' work on their understanding of game based learning.

The on-going end goal is to analyze and formulate toward a preliminary theory of game-based learning using Bloom's framework as a foundation. The question posed earlier was whether game-based learning fits Bloom's Taxonomy? The response, based on the 3 components will likely be a multifaceted one, in which the core pieces match, but the order or route taken might look drastically different.

There are definitely stark limitations to this comparison, for one, definition of what constitutes game based learning is vague at best, it will be improvised based on piecemeal writings of the current researchers in the field. The other, a data flow diagram of a digital game is a mixed bag – which game? Why that game? Self-report or observation? For that I will probably go with self reporting on 1-2 game, possibly observation for another, and contrast it with two published papers that used self-reporting for game experience documentations. Even given the limitations, and the

likelihood that a replication probably will net different results, it is still an important step in the research process to attempt to explore connections between emerging areas and established frameworks.

Another angle to analyze the contrast is to look at Bloom's Taxonomy as a roadmap to the traditional book-learning approach, or an instructionist view of education. A good number of educational games have been created in the past 2-3 decades, and many would probably fit Bloom's hierarchical framework perfectly. The current game-based learning approaches may best be aligned with the constructionist view of education, where the focus is on examining how the game experience may be a relevant means of learning subjects in and out of games (Kafai). This is also where Thomas Malone's work in the 80s on motivation plays a role – the constructionist view incorporates an inherent self-motivation toward formulating knowledge, rather than waiting to be instructed.

Bloom's taxonomy is an exemplary example of connecting research ideas with the wider practice. At its heart, the taxonomy complements the traditional academic procedures of step-by-step learning. The digital game environment, on the other hand, enables an approach of letting the learner (or player) engage the content first, then modify their approach through iterative failure/feedback – another words, almost going by the reverse order of Bloom's hierarchy. The pursuit of evidence for or against this assertion is the purpose of analyzing Bloom's Taxonomy in an attempt to formulate a framework to better understand learning in relation to digital games.

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